



GRID RELIABILITY & RESILIENCE IN AN AGE OF INCREASING RISK

In the past year alone, multiple regions across the country have experienced unprecedented threats to the electricity system due to natural disasters and extreme natural events such as wildfires, deep freezes, droughts, and extreme heat. During these extreme events, maintaining an electricity supply is essential to keeping communities healthy and safe. States and utilities must prepare for growing weather extremes and other disruptive events, while maintaining affordability for electricity customers. There is no silver bullet to building a resilient grid, but a modernized and interconnected grid, resource diversity, and effective planning can all help to help Virginia's grid be more resilient and reliable.

SUSTAIN AND STRENGTHEN VIRGINIA'S GRID

Virginia's grid is part of PJM, a regional electricity market that stretches from the North Carolina border north to New York, and from the Atlantic west into Ohio and parts of Illinois. It is considered to be among the most sophisticated and integrated interstate energy markets in the US. As such, Virginia is distinctly dissimilar from Texas. Unlike the Lone Star state, our Commonwealth can call upon generation from other states to support our needs should a power plant trip offline or a transmission line fails.

While Virginia remains part of PJM, there's more we can do within our borders to strengthen the local grid that serves families and businesses day-to-day. Chief among these actions is grid modernization, which integrates 21st century communications and data technology into the electric transmission and distribution system. A modernized grid can help the utility identify and repair outages more quickly, better integrate distributed resources, and unlock an array of energy efficiency and demand response programs to manage demand on the grid. *The next Administration should prioritize full, cost-effective modernization to increase grid resilience and reliability across the Commonwealth.*

CONTINUE TO GROW GRID DIVERSITY

All resources are vulnerable to interruption and all technologies can suffer failures. The recent crisis in Texas shows that traditional resources long touted as "reliable", including coal and natural gas, may not be in times of significant grid stress. Fossil-fuel based generators are complex machines with multiple components susceptible to failure. Fuel supply constraints also pose a significant threat to the availability of such generating capacity during unexpected events.

The most resilient energy systems draw from diverse resources and avoid being overly reliant on resources with acute mechanical or fuel risks. Renewable energy technologies, such as wind turbines and solar panels, have fewer mechanical parts to fail. They don't rely on fuel supplies that can be cut off or cooling systems that are vulnerable to drought or deep freeze. As long as they are equipped with the appropriate weatherization technologies, they often perform better under extreme conditions than

thermal power plants. Per the US Energy Information Agency, as of 2019 natural gas produced 60% of the electricity in Virginia. The Virginia Clean Economy Act (VCEA) has multiple facets to diversify our grid, such as a Renewable Portfolio Standard (RPS) and Clean Energy Standard. *The next Administration should support full, cost-effective implementation of the VCEA to increase generation diversity.*

Geographic diversity can also enhance system resilience. Distributed energy resources, including energy efficiency (EE), demand response, rooftop solar, and battery storage are unlikely to all fail at once and can reduce stress on the grid during extreme events. Microgrids can keep critical infrastructure running when the wider system fails. Provisions in the VCEA, such as the EE standard, expansion of solar power purchase agreements, and creation of a carve-out for distributed generation in the RPS are aimed at increasing the deployment of distributed resources across Virginia. *The next Administration should seek to support and expand these provisions to enhance the geographic diversity of our energy grid.*

REVISIT RISK IN PLANNING

Utilities and grid operators traditionally plan their systems to withstand extreme events based on historical data. Increasingly, this data is inadequate to inform what we can expect in the future. Utilities, the SCC, and grid operators must reconsider their assumptions, models, and decision-making criteria related to infrastructure needs and weatherization in the face of increasing future risk. *The next Administration should ensure that Virginia's energy planning processes integrate up-to-date data and assumptions around both changing climate risks and the capabilities of advanced energy technologies.*

CASE STUDIES

The **Texas Grid Outages of February 2021** exposed the vulnerability of fossil-fuel powered generators, which failed due to the cold or were forced offline when their fuel supply was interrupted. Analysis of this event is ongoing, but the Electric Reliability Council of Texas initially determined that approximately 30 gigawatts (GW) of natural gas, coal, and nuclear energy was forced offline, along with just under 18 GW of wind power, of which 6 GW had been expected to provide winter power. Most of Texas also operates as an isolated electricity grid, which prevented it from importing power from nearby states. *The Texas crisis was unique in many ways, but it demonstrates how a Regional Transmission Organization that is created to facilitate resource sharing across the east coast can minimize Virginia's risk.*

The **2020 summer rolling outages in California** occurred during a prolonged extreme heat event across the Western U.S. According to the Final Root Cause Analysis produced by the state's energy agencies, climate change-induced extreme weather, resource adequacy planning, and day-ahead market practices contributed to disruptions in electricity supplies in early evening hours. *The agencies noted that all resources - including natural gas generation - experienced challenges in meeting demand during critical periods.* The California Public Utilities Commission and California Independent System Operator are in the process of implementing a series of reforms to reinforce reliability during summer peaks while making continued progress in achieving the state's goal of 100% zero-carbon electricity by 2045.